

Flight Instructor Training Module

For Inclusion in FAA-Approved Flight Instructor Refresher Clinics

Volume 1: **FAA/Industry Training Standards**



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Foreword

FAA/Industry Training Standards, or FITS, is a joint government-stakeholder initiative designed to reduce the total number of general aviation (GA) accidents. To do this, FITS will introduce proven concepts in system safety to training for technically advanced aircraft (TAA). This represents a significant paradigm shift, allowing GA training to evolve from a skill-based instructional and examining activity; to one that uses scenario-based training to integrate risk management, aeronautical decision-making (ADM), situational awareness, and single-pilot resource management (SRM) into every flight operation. FITS is the key to ensuring this change occurs in a structured manner, one that involves all facets of the general aviation community.

This *Flight Instructor Training Module*, the first in a series of new instructional resources, is designed to achieve two objectives. First, it will familiarize flight instructors with the FITS program, including its history, objectives, methods, and future goals. Second and perhaps most important, this module will provide instructors with the guidance needed to develop their own FITS-based training curricula.



The new Diamond Star DA-40

FITS Terminology

As you review this training module and other FITS materials, you will be introduced to many new terms, some of which include:

Aircraft Automation Management- The demonstrated ability to operate an aircraft by means of on-board automated systems.

Automated Navigation Leg- A flight of 30 minutes or more conducted between two airports in which the aircraft is controlled primarily by the autopilot and on-board navigation systems.

Automation Competence- The demonstrated ability to understand and operate a given aircraft's automated systems.

Automation Surprise- The ability of an automated system to provide different cues to pilots when compared to the analog system it replaces, especially in time-critical situations.

Automation Bias- The relative willingness of the pilot to trust and utilize automated systems.

Candidate Assessment- A system of critical thinking and skill evaluations designed to assess a student's readiness to begin training at the appropriate level.

Critical Safety Tasks/Events- Those mission-related tasks/events that if not accomplished quickly and accurately, may result in aircraft damage, injury, or loss of life.

Data link Situational Awareness (SA) Systems- Systems that provide real-time weather, traffic, terrain, and/or flight planning information to the cockpit. This information may be displayed on the Primary Flight Display (PFD), Multi-Function Display (MFD), or other related cockpit displays.

Emergency Escape Maneuver- A maneuver or series of maneuvers performed manually or with the aid of the aircraft's automated systems that allows a pilot to successfully escape from an unanticipated flight into Instrument Meteorological Conditions (IMC) or other life-threatening situations.

Generic FITS- These standards cover broad categories of training functions in technically advanced aircraft, such as flight reviews, complex/high-performance training, and training toward a new certificate or rating. Individual training entities (e.g. flight instructors, pilot schools) may adapt them for a particular aircraft or other scenarios.

Learner Centered Grading-

Desired Pilot in Training Scenario Outcomes- The object of scenario-based training is a change in the thought processes, habits, and behaviors of the students during the planning and execution of each scenario. Since the training is student- centered, success is measured in the following desired student outcomes:

- **Describe-** At the completion of the scenario, the student will be able to describe the physical characteristics and cognitive elements of each activity.
- **Explain-** At the completion of the scenario, the student will be able to describe the training exercise and understand the underlying concepts, principles, and procedures comprising each activity.
- **Practice-** At the completion of the scenario, the student will be able to practice the activity with little input from the instructor. The student, with coaching and/or assistance from the instructor, will quickly correct minor deviations and errors.
- **Perform-** At the completion of the scenario, the student will be able to perform the activity without assistance from the instructor. The student will quickly identify and correct any errors and deviations. At no time will the successful completion of the activity be in doubt. “Perform” will be used to signify the student is satisfactorily demonstrating proficiency in traditional piloting and systems operation skills.
- **Manage/Decide-** At the completion of the scenario, the student will be able to correctly gather the most important data available both within and outside the cockpit, identify possible courses of action, evaluate the risk inherent in each course of action, and make the appropriate decision. “Manage/Decide” will be used to signify the student is satisfactorily demonstrating acceptable SRM skills.

Light Turbine TAA- A jet or turboprop TAA certified for single-pilot operations, weighing 12,500 lbs or less, equipped with cabin pressurization, conventional (non-swept) wings and capable of operating in Class A airspace on normal mission profiles.

Note: Light Turbine TAA is specifically defined as having a non-swept wing due to the significantly increased training demands for pilots transitioning to swept-wing aircraft.

Mission Related Tasks- Those tasks required for the safe and effective completion of the flight.

Multi-Function Display (MFD)- A device that combines primarily navigation, systems, and situational awareness (SA) information onto a single electronic display.

Primary Flight Display (PFD)- A device that combines the six primary flight instruments plus other related navigation and situational awareness (SA) information into a single electronic display.

Proficiency Based Qualification- A qualification based on demonstrated performance rather than other flight time or experience.

Scenario-Based Training (SBT)- Training systems that use a highly structured script of “real-world” experiences to address flight-training objectives in an operational environment. Such training may include initial, transition, upgrade, recurrent, or specialized training.

Simulation- The use of animation and/or actual representations of aircraft systems to faithfully replicate the flight environment.

Single Pilot Resource Management (SRM)- The “art and science” of managing all available resources to ensure the successful outcome of the flight.

Specific FITS- A FITS program tailored for a specific aircraft or technology.

System Safety- The application of special technical and managerial skills to identify, analyze, assess, and control hazards and risks associated with a complete system (i.e. a typical flight). System safety is applied throughout the system’s entire lifecycle (i.e. preflight planning to tie-down) to achieve an acceptable level of risk within the constraints of operational effectiveness, time, and cost.

Technically Advanced Aircraft (TAA)- A general aviation aircraft that contains a GPS navigator with a moving map display, plus any additional systems. Traditional systems, such as autopilots, are included when combined with GPS navigators.

Training-Only Tasks- Training maneuvers that while valuable to the pilot’s ability to understand and perform a mission related task, are not required when demonstrating proficiency. Similar to demonstration-only maneuvers, such as cross-controlled stalls, flight instructors should be highly proficient in Training-Only Tasks.

Introduction

Flight training within the general aviation (GA) community has reached a critical juncture. While the industry as a whole enjoys an admirable safety record, recent statistics show an increase in both total and fatal accident rates. This fact, coupled with the proliferation of advanced technologies in small aircraft cockpits, has led the Federal Aviation Administration (FAA) to take a critical look at how pilots are trained.

What is FITS?

In an effort to address the causal factors associated with many GA accidents, as well as the introduction of new cockpit technologies, the FAA has partnered with industry to develop the FITS program. FITS, or *FAA/Industry Training Standards*, offers a new approach to GA flight training, one that embraces concepts central to system safety. These include risk management, aeronautical decision-making, situational awareness, and single-pilot resource management. Instead of treating each element as a separate or stand-alone lesson, scenario-based training will be used to efficiently integrate these important concepts into every instructional exercise.

To maximize the benefits of this program, FITS will focus on the segment of general aviation that uses single-pilot, small reciprocating or turbojet/turbofan-powered, technically advanced aircraft for personal transportation. While FITS may offer advantages beyond this narrow scope, the justification for this focus is clear. Air carriers and larger, crew-served corporate operators currently have in place extensive training requirements. In addition, these communities enjoy a record of safety that is unsurpassed. While operational and regulatory differences pose unique challenges for GA, statistics have shown that structured, scenario-based training is the key to achieving the high level of safety enjoyed by the airlines and larger corporate operators.



Advanced cockpit systems will soon find their way into perennial favorites, such as Cessna's new 172.

What FITS is *NOT*

Realizing the need for support within the GA community, the FITS program has been carefully developed to avoid placing additional burdens on the flying public. Therefore, FITS will not encumber pilots with additional regulations and policies that make flying more difficult or costly. Instead, FITS will take a non-regulatory, incentive-based approach to improving flight training through superior guidance and innovative

instructional programs. FITS is intended to raise the level of aviation safety by improving the quality of flight training. For this reason, it is important that all stakeholders actively participate and embrace the FITS philosophy.

In addition, FITS will not evolve without input from the GA user community. Because flight safety is everyone's concern, FITS program development will involve pilots, flight instructors, airframe and avionics manufactures, insurance providers, as well as research and academic institutions.

This brings us to the next point. FITS will not be stagnant. Unlike the current flight training system, which has changed very little over the last 60-70 years, FITS will evolve to meet the ever-changing needs of pilots and flight instructors.

Finally, FITS is not an *ad hoc* module to be discussed only at the end of an instructional program. Instead, FITS principles should be integrated throughout the training process. For many instructors, this will simply be business as usual. For others, FITS will require an entirely new approach to flight training. For those who count themselves among the latter, consider that FITS is an incentive-based program. While there is no requirement for you to change lesson plans or review FITS with your students, the benefits that accompany FITS will eventually make it the industry standard for pilot training. With that in mind, the FAA is encouraging all flight instructors to work toward building their own FITS training curriculum, one that uses scenarios to incorporate risk management, single-pilot resource management, aeronautical decision-making, and situational awareness into each instructional exercise.

Why is FITS Needed?

As mentioned earlier, flight training has changed very little since the dawn of regulated



Aircraft like the Adam 500 will demand a new approach to flight training. (Photo courtesy of Adam Aircraft)

aviation. In fact, a private pilot trained to standards outlined in the Civil Aeronautics Regulations, circa the 1940's, would likely do quite well in most operations required by today's practical test. This is because many of the basic skills needed to pilot an aircraft have changed very little. However, the development of new technologies and a rapidly evolving airspace system have outpaced current training methods. Moreover, the FAA and the flight training community now have over a century's worth of experience upon which to draw when determining how best to train pilots. While the military and

airline communities have leveraged this experience, the general aviation community has been slow to make use of the lessons learned.

What has resulted from the GA community's failure to adapt? In the vast majority of fatal GA accidents, the root causes were found to be a lack of situational awareness and poor aeronautical decision-making. Currently, pilot training standards focus less on these factors, and more on the development of mechanical, or "stick and rudder skills." While such skills must never be neglected, most fatal accidents are not a result of deficiencies in these areas.

Finally, as if the higher number of fatal accidents and an increasingly complex operating environment weren't enough, the number of technically advanced aircraft continues to grow dramatically. Cirrus Design is now producing 12 aircraft a week, while manufacturers such as Cessna, Piper, Lancair Certified, Mooney, and Diamond Aircraft are introducing "glass" cockpit systems to their respective lines of piston singles and light twins. Couple this with the new generation of single-pilot jets scheduled for production, and it becomes clear that training techniques rooted in the 1930's and 40's are woefully inadequate for the 21st century aviator.

In short, as the capabilities of GA aircraft continue to increase, so too will the piloting skills required to maximize both safety and operational effectiveness.

Keys to Success

First and foremost, the FAA needs flight instructors like you to make FITS a success. Because FITS seeks to address issues involving technically advanced aircraft and other difficulties of concern to all general aviation (GA) pilots, it is important that we reach



The Cirrus SR-22 typifies the next generation of technically advanced piston singles. (Photo courtesy of Cirrus Design)

active instructors throughout the flight training community. This training module, along with other web-based resources, represents the FAA's initial efforts to "institutionalize" FITS by involving the entire flight instructor community.

The success of FITS also hinges on the development of value-added programs and new instructional resources. These FITS "products" will be the cornerstone of the FAA's efforts to modernize the flight training system. For this reason, the FAA is committed to providing new source materials and written guidance (such as this training module), and to

developing an integrated training system that will maximize FITS effectiveness. This includes new aircraft/avionics-specific and generic training programs, improved pilot examiner guidance, changes to the Practical Test Standards (PTS), and new methods of maintaining flight proficiency and renewing flight instructor certificates. With the help of industry partners and the active support of the flight training community, the FAA is

confident that FITS will make flying safer and less expensive, while improving the practicality of flight training within the general aviation community.

FITS Program Overview

As discussed earlier, FITS was originally intended to address the training and operational deficiencies most likely to result in fatal aircraft accidents. While the system safety philosophies central to FITS are well suited to the entire GA community, they are particularly critical in the operation of technically advanced aircraft. Because current training methods predate the advent of such aircraft, the process of identifying systemic deficiencies evolved quickly. However, formulating solutions took considerably more time and effort. Early in 2002, the FAA began pursuing a strategy to integrate risk management, aeronautical decision-making, situational awareness, and single-pilot resource management into the current flight training system. Scenario-based training would bridge the gap between how pilots are trained and how they fly in the “real world.”

This plan evolved from two distinct principles. First, improvement in these four areas, risk management, aeronautical decision-making, situational awareness, and single-pilot resource management collectively represent the best strategy for reducing aviation accidents. For validation, one needn’t look beyond the air carrier and business aviation communities. Second, training that incorporates these elements is tailor-made for the new aircraft, advanced cockpit systems, and evolving procedures inherent to the modern GA environment.

Because new advances in aircraft technologies originally drove FITS development, the FAA immediately approached recognized GA industry partners Eclipse Aviation and AirShares Elite (comprised of Lift Aviation, AirShare Elite, and Cirrus Design). Given their advanced cockpit systems and the emphasis they placed on training, these partners were an obvious choice to help spearhead the FITS program. Working in concert with the FAA and the Air Transportation Center of Excellence for General Aviation, Center for General Aviation Research (including: Embry Riddle, the University of North Dakota, Wichita State University, the University of Alaska, and Florida A&M), these institutions began working on the development of both generic and type-specific FITS resources.



The Eclipse 500 will introduce a new level of simplicity, capability, and safety to the light jet market. (Photo of courtesy of Eclipse Aviation)

With a clear focus and sound justification, the FAA turned its attention toward building the additional partnerships needed to make FITS a success. To that end, an industry team was formed to provide strategic guidance and industry feedback on FITS product development. This multidisciplinary group has proven instrumental in the development, deployment, and validation of FITS materials. Of equal importance, as FITS matures and evolves, this team will serve as a catalyst for new ideas while validating the effectiveness of ongoing efforts.

Now that FITS is fully underway, figuring prominently in the Administrator's 2004-2008 *Flight Plan*, other industry partners continue to expand the program. Adam Aircraft, Cessna, Garmin, Lancair Certified, Avidyne, and Diamond Aircraft are just a few of the companies now adding their expertise and experience to FITS, ensuring the program will continue to flourish.

Additional FITS Resources

As the FITS program evolves and new resources are introduced, pilots and flight instructors will have immediate, web-based access to FITS documents (such as the new FITS-accepted generic transition syllabus) through <http://www.faa.gov/avr/afs/fits>. Also, the FAA's *Flight Plan* for 2004-2008, which includes the FITS program, may be downloaded by visiting http://www.faa.gov/apo/strategicplan/FAA_Flight_Plan.pdf.



Even traditional aircraft, like the V-35 Bonanza, are being retrofitted with advanced cockpit avionics.

What can FITS do for me?

So the obvious question now becomes, "What can FITS do for me if I don't fly or teach in highly sophisticated, glass-panel equipped, aircraft?" The answer...FITS concepts are as applicable to visual flight rules (VFR) operations in a GPS-equipped Cessna 172 as they are to the Cirrus SR-22 pilot flying under instrument flight rules (IFR). Risk management, aeronautical decision-making, situational awareness, and single-pilot resource management are skills essential in any aircraft cockpit, regardless of its complexity.

Also, because FITS promotes a more realistic approach to flight training, the FAA will be able to offer FITS users a host of new benefits including streamlined flight reviews and instructor renewals, as well as transition and recurrent training programs that more effectively meet the needs of GA pilots.

Of equal importance, particularly to those who own technically advanced aircraft, FITS training can help keep insurance costs at manageable levels. How will this be accomplished? Traditionally, when new aircraft and/or technologies enter the market, insurance companies have a difficult time assessing potential risk, a major determinant in establishing rates. Because GA lacks a regulatory requirement for structured transition training, insurance companies are often forced to mandate certain conditions in order to write policies. This usually translates into expensive, often burdensome, experience (time-in-type) requirements. Also, because much of the training is not well structured, the pilot receives minimal benefits from the additional instruction. This is clearly a disservice to the owner/operators of such aircraft, and has the undesired effect of discouraging pilots from investing in new technologies.

By offering a FITS alternative, pilots will receive the training they need in less time and with less expense. Insurance companies, recognizing the benefits of such training, will be in a position to offer lower rates. Furthermore, owners of less exotic aircraft can benefit from lower insurance costs enabled through FITS training. This is because insurance companies recognize and reward structured training that addresses the causal factors associated with many GA accidents, regardless of the aircraft type.

Getting Started

The purpose of this training module is to help you, the instructor, incorporate the principles of system safety into each training activity. Doing so will help you to train better pilots—pilots who are safer and more confident in their abilities. Moreover, FITS-style training will help make the learning process more enjoyable, more exciting, and more relevant for your student.

Because the traditional stick and rudder skills emphasized in the current PTS remain an integral part of modern flight instruction, they are an excellent point from which to begin our overview of FITS-style training. Let's start by reviewing the Private Pilot PTS for Airplanes. For this example, we'll use short field landings to illustrate how easily FITS may be integrated into any flight training exercise.



The increased capabilities of modern aircraft, such as those produced by Lancair, demand a more sophisticated approach to flight planning. (Photo courtesy of Lancair Certified)

Short field landings are an essential skill for a complete, proficient pilot. However, to primary students, this (or any other) maneuver involves only those elements presented by the instructor. If the only goal stressed is to land on a predetermined point, the student will take nothing else from the exercise. A student with limited flying experience does not yet fully understand the complexities that go beyond the mechanics of the maneuver. As an instructor, you must draw upon your experiences to supplement the learning process. To further illustrate this point, let's review a short field landing in the context of a FITS training scenario.

Initially, the student must master the basic mechanics before higher order thinking can be introduced. This means that repetition and practice are used to impart essential stick and rudder skills. This technique varies little from the method used to train pilots over the last +80 years. Proficiency will be gained in managing speed, pitch, and power while flying a proper traffic pattern. Once mastered, the instructor may then move to the second phase of this training exercise by introducing some key system safety elements.

This will begin with aeronautical decision-making. With practice, the student will learn to properly configure the aircraft and establish the necessary descent profile. He or she may also come to rely on landmarks at their local airport to fly an ideal traffic pattern. While these are all important factors, the student has yet to consider any of the elements stressed by FITS. For example, will the flight be conducted into a busy airport? If so, how will variations in speed and traffic pattern spacing impact the consistency of each short field landing? Under what circumstances would attempting this maneuver be undesirable? To what extent will a contaminated runway surface increase landing distance? If air traffic control requests a higher than normal approach speed, how will this impact the ability to make a short field landing? How will an obstacle on the runway approach end impact or limit the use of a given airport? If an emergency or abnormal condition were to take place, how would this change the criteria for choosing a suitable runway?

As with any complex maneuver, there are a host of additional considerations. Is the runway length suitable for short-field touch and go operations? If so, is the runway length also adequate if the aircraft's flaps/slats fail to extend? The answers to such questions will help provide the all-important situational awareness needed to identify hazards and evaluate potential risks. The extent to which available resources, strategies, or techniques can be used to manage risks is the basis for sound aeronautical decision-making. As an instructor, your task is to help your students incorporate this process into every flight. The use of innovative and detailed training scenarios will help in achieving the desired learning outcomes.

With this in mind, we may now take our strategy and use it in the context of a formal lesson plan.

FITS Lesson Plan (Example)

1. Type of training: **Transition**
2. Maneuver or training objective: **Familiarize student with high-performance flight operations; short field take-offs and landings in a Beechcraft A-36 Bonanza**
3. Possible hazards or considerations (These examples are provided for training purposes only. Items may be added or omitted as necessary to reflect your unique operation.):
 - a. **Runway surface conditions**
 - b. **Runway length/width**
 - c. **Winds conditions**
 - d. **Ground-based obstructions/hazards**
 - e. **Visibility/ceiling**
 - f. **Gear extension/retraction difficulties**
 - g. **Engine-out procedures**
 - h. **No-flap landings**
 - i. **Alternate landing locations**
 - j. **Airport traffic**

k. Rejected/balked landings/go-arounds

l. Touch and go landings

m. Land And Hold Short Operations (LAHSO)

n. Variations in approach speed (such as when required by ATC)

4. Mitigation strategies and resources (Every hazard or consideration should be addressed though the use of some mitigating strategy or resource. Those provided below serve only as an example to illustrate the system safety methodology.):

Runway surface conditions: Short field operations will not be conducted on contaminated (standing water, snow, ice) runways, or runways with surfaces comprised of gravel or other loose sediment. Should such conditions be encountered, the pilot will divert to a suitable alternate. Current and forecast weather, Notices to Airmen (NOTAMs), the Pilot's Operating Handbook/Flight Operations Manual (POH/FOM), Airport/Facility Directory (A/FD), and Pilot Reports (PiReps) will be reviewed to determine a runway's suitability.

Runway length/width: Short field operations will not be conducted on runways that are less than X (insert appropriate length) feet in length. The distance will be a function of runway configuration and surface, aircraft performance, weather conditions, plus any additional margin for safety deemed appropriate by the pilot in command. For training purposes, a runway of at least 1.3X feet (or other figure deemed appropriate by the pilot in command) will be used.

Winds conditions: Short field operations will not be performed when the crosswind/tailwind component exceeds X (insert appropriate speed) knots. The instructor and student will use the aircraft POH/FOM and assess the runway environment prior to making a determination. This would also be an excellent catalyst for a discussion of personal minimums and any additional training requirements.

Ground-based obstructions/hazards: The instructor and student will review all available resources, including sectional/terminal area charts, A/FD, and Notices To Airmen (NOTAMs). Using aircraft performance data found in the POH/FOM, the potential impact of any obstructions or hazards will be assessed and a strategy developed to address any concerns.

Visibility/ceiling: The instructor and student will discuss the impact of visibility/ceiling as it relates to short field landing operations. For example, if circumstances demand the conduct of a circling approach under marginal VFR conditions, does the student have the confidence and proficiency to fly a tight pattern while managing airspeed, aircraft coordination, etc? Under such circumstances, would it be more desirable to conduct a straight-in approach with a slight tailwind (if that is even an option)? How much wind would be too much? What other variables/options should be considered (perhaps a diversion to a more suitable airport)?

Gear extension/retraction difficulties: While not a problem specific to short field operations, certain airports/runway environments may be more conducive to landings with a partial/complete landing gear failure. Factors to be discussed should include runway length, surface type, availability of emergency equipment, repair facilities, and any other safety of flight issues deemed appropriate.

Engine out procedures: Should an engine failure, or partial loss of power necessitate the unplanned use of a short field, a much higher degree of precision will be required to land the aircraft safely. Perhaps an emergency off-airport landing into a long, flat field would be more advantageous than a power-off landing into a short runway flanked by obstructions? The student and instructor should discuss and simulate, in a manner consistent with safety, engine out procedures as part of a comprehensive training program.

No-flap landings: Using the aircraft POH/FOM, the instructor and student will determine the aircraft's landing performance should a partial or no-flap landing become necessary. A student-led discussion should also take place to determine personal minima for the conduct of such operations. Attention will also be given to how other factors, such as deteriorating weather or a mechanical abnormality, may precipitate a change in landing minima.

Alternate landing locations: There are numerous circumstances that may necessitate the use of an alternate landing site. These include diversions made for changing weather conditions, mechanical anomalies, or even a medical emergency. The instructor and student, using the aircraft POH/FOM, should discuss how runway length and aircraft performance impact the selection of alternates during cross-country flight operations. Methods for determining a proper alternate under a variety of normal, abnormal, and emergency conditions must be emphasized as part of the pre-flight planning process.

Airport traffic: Traffic at both towered and non-towered airports often necessitates wide variations in landing patterns. Changes in the pilot's "sight picture," particularly when transitioning to a new aircraft, could lead to approaches that are too fast and/or too high to allow a successful short field landing. While issues stemming from airport traffic may largely be addressed through sound flying technique, the instructor can take an otherwise routine lesson and introduce other risk elements, thus promoting the student's development of critical decision-making skills.

Rejected/balked landings/go-arounds: Even the most proficient pilots will occasionally make less than ideal landings. While such events usually result in nothing more than a bruised ego, a mishandled balked landing can have tragic consequences. This is particularly true when other potential hazards are present. It isn't difficult to imagine a scenario in which a pilot lands long on a relatively short runway. This is followed by a "bounced" landing. Instead of conducting an

immediate go around, the pilot attempts to salvage the landing, and in the process, consumes more valuable runway. Now the pilot, who has failed to dissipate excess speed, finds the runway end quickly approaching. Unfortunately, the high density altitude and tall tree off the runway's departure end now conspire to make an attempted go-around extremely dangerous. Instructors should introduce students to such a scenario in a controlled environment- one that is safe, yet makes clear how quickly a routine landing can deteriorate into a catastrophic event.

Touch and go landings: Touch and go operations will not be conducted into runways that are less than X (insert appropriate distance) feet in length. This length will vary depending on the runway environment, meteorological conditions, pilot currency/proficiency/comfort, etc. As part of this training exercise, each of the aforementioned elements, and their potential impact on touch and go operations, should be discussed in detail.

Land And Hold Short Operations (LAHSO): While not often thought of a GA issue, some smaller regional airports do have approved LAHSO procedures. The acceptance of a LAHSO clearance carries with it certain operational considerations, including landing distances, runway length/configuration/distance, and other airport traffic. The A/FD, NOTAMs, and aircraft POH/FOM will be used to determine when, or if, a LAHSO clearance will be accepted. The student and instructor will then review how to conduct this procedure safely.

Variations in approach speed: Due to air traffic considerations, it is often desirable to fly a higher-than-normal approach speed for a given aircraft. This requires additional skill and proficiency in transitioning from an approach to the landing phase of flight. It also potentially complicates the short-field landing process, particularly when combined with other elements, such as a touch and go landing or a LAHSO clearance. While technique is an important element, a frank discussion of aircraft performance, pilot skills, and personal minima should also be included in this lesson.

5. Alternatives:

Time: When planning a training exercise, time is always a variable to consider. For example, the pilot and/or instructor may determine that based on forecast weather conditions, it would be prudent to delay a training exercise (or other mission) until the winds, ceiling, or visibility improve.

Location: If airport conditions do not allow the planned training or operational exercise to be conducted safely, another venue should be chosen. This flexibility should be stressed during the planning/instructional process.

Abort training exercise: This alternate is included to emphasize there are times when aborting a flight or choosing not to perform a particular maneuver or operation is an appropriate and prudent course of action.

6. Requisite skill sets: **The student receiving training should be familiar with the basic handling characteristics of the Beechcraft A-36. In addition, the student should be able to demonstrate proficiency in the conduct of normal landings.**

7. Scenario-based training methodology: **The instructor will integrate two or more of the identified hazards into a cross-country flight operation. The choice of hazards will be made so as to realistically highlight risks likely encountered under similar circumstances. This will force the student to use both mechanical and cognitive skills in a dynamic environment- one that contains the distractions, challenges, and potential hazards found in a typical GA mission.**

8. Materials: **Aircraft POH/FOM, FITS Generic Transition Syllabus, A/FD, Aeronautical charts, etc.**

Notice the elements included in the lesson plan are less technique-oriented, instead focusing on risk management and decision-making. Initially, the instructor may take the lead in identifying risks and developing mitigation strategies. However, as the training progresses, the student will ideally assume this role, demonstrating an optimal level of understanding and application. Moreover, using these tactical elements as the basis for all training maneuvers establishes the desired system safety mindset. A further review of the lesson plan will illustrate this point.

First, every maneuver has a series of risk factors and/or considerations that must be identified. A person with limited flying experience may only recognize a fraction of these items. As an instructor, you should develop scenarios that highlight all known risk factors and other considerations associated with a given maneuver. The goal is to expand the student's zone of competence and confidence (i.e. comfort) to cover any foreseeable challenge.

Next, FITS benefits can most quickly be realized by reviewing the mitigation strategies discussed in *item 4*. Students should be taught to employ these strategies for each possible hazard/consideration using the four tenets of system safety- risk management, aeronautical decision-making, situational awareness, and single-pilot resource management. If a risk factor or consideration (*item 3*) cannot be addressed through a mitigation strategy or resource (*item 4*), then an alternative must be considered (*item 5*). The ultimate goal is not the development of yet another checklist. Instead, this process should be used as a framework through which critical thinking and judgment are integrated into each of the items covered in the PTS. From there, pilots should have the ability to take the next logical step in the evolution of their flying- that is, the ability to bring this level of analysis and insight to every flight they make.

So along with the basic mechanics of a short field landing, you have also introduced your student to other safety of flight issues using FITS instructional techniques. From here, you may move to the final step, the development of an integrated training exercise that allows your student to apply what he or she has learned. For additional examples of how this may

be accomplished, instructors are encouraged to visit the FAA's FITS homepage and review other FITS-accepted curricula.

The instructor should next use scenario-based training to highlight both the hazard identification and risk management elements of this training exercise. For example, a VFR cross-country flight could be initiated. While en route, deteriorating weather (or another simulated condition) could force a diversion. The student will quickly experience increased workloads while determining an appropriate alternate, navigating, communicating with ATC, managing aircraft systems, etc. At this juncture, runway length or condition is but one of many concerns the student faces. These realistic distractions will not only test the student's stick and rudder skills, but also their judgment in safely managing the flight.

Ideally, the scenario will provide the student with several choices, each with its own unique operating challenges. One airport may have a short grass runway, while another has a paved runway that is shorter still, with an obstacle at the approach end. As conditions continue to deteriorate, the student may be forced to select an airport that is less than ideal for their aircraft. Once they've entered the airport traffic pattern, they may find the flaps will not extend. This forces them to make yet another decision. Do they risk a landing at a short field, or press on into deteriorating weather conditions? Each decision carries with it consequences, which will become apparent as the flight continues.

Obviously such a scenario would be inappropriate for a student in the early phases of training. However, the three-step process identified above allows FITS to be introduced at a reasonably early phase of training. As the student matures, increasingly complex scenarios may be used to test the student's ability to expertly manage the flight. The scenario used in this example not only tests the student's ability to make a short field landing, it also forces them to use all available resources, manage risk, exercise judgment, and demonstrate situational awareness. In addition, as part of a comprehensive training program, such a scenario may also be used to teach preflight planning and cross-country flight operations, weather avoidance, ATC communications, avionics and auto pilot usage, emergency procedures, etc.; while reinforcing the stick and rudder skills so important to safe flight. To view it another way, FITS is an essential element to a balanced flight-training program.



An unidentified hazard or unmanaged risk can have tragic consequences.

For sake of exercise, we can take one more item from our list of hazards/considerations. In this case, let's review balked landings. While a major consideration during any flight, aircraft performance is particularly critical while maneuvering close to the ground. Should your student land long on a short runway, bounce or begin to porpoise, and find it necessary to apply power and

go around, such an event could quickly turn into a very dangerous situation. Add to that factors such as high-density altitude and an obstruction off the runway's departure end, and things could quickly go from bad to worse. Fifteen hundred feet down a 1,800-foot runway while traveling at 45 knots is a bad time to begin reviewing options. The student should identify ways to avoid placing him or her self in such a situation.

Perhaps that means finding another airport under certain conditions. It may also entail additional practice to gain proficiency. Executing a go-around is also a valid option, but this too should precipitate a discussion of the elements involved in such a maneuver. For example, the student should be able to determine the point beyond which a touch and go, even one instigated by a balked landing, will not be attempted unless a prescribed airspeed has been reached. If these conditions are not met, the pilot must be committed to remaining on the ground, even if it results in some aircraft damage. If a series of events places you somewhere you'd rather not be, just remember it's better to address such matters on the ground than to strike a tree and crash on an ill-advised go-around. Ideally, FITS training will help prevent your student (or you) from setting such events into motion. Again, a pilot who can identify potential hazards and mitigate them through pre-flight planning is well equipped to handle most in-flight challenges.

In covering these scenarios, we have demonstrated how to introduce system safety principles to traditional flight maneuvers using FITS. However, those same objectives and methods need not be confined to those items covered during the practical test. Instructors could easily develop a FITS syllabus to enhance the quality of flight reviews, instrument proficiency checks, the training of pilots to handle unusual emergencies, complex and/or high performance checkouts, etc. The possibilities are endless, and the FAA encourages instructors to be innovative in developing training strategies. The example provided is but one of an infinite number of methods for developing a FITS training program.

If you are not comfortable with creating such materials, or have concerns over how your students will be tested, there is good news. The FAA, along with its industry partners, is continuing to develop resources to help maximize the benefits offered through FITS. In addition, as enhancements are made to each PTS, the FAA will provide guidance to Aviation Safety Inspectors, Designated Pilot Examiners, pilots, and flight instructors to ensure the necessary standardization takes place.

FITS FAQs

Any discussion of FITS will typically raise several questions. These queries, along with their answers, are provided below.

Question: How would you define FITS?

Answer: FITS is best described as a vehicle for applying system safety concepts to training in technically advanced aircraft. The FITS program is designed to help flight instructors effectively use scenario-based training to integrate risk management, aeronautical decision-making (ADM), situational awareness, and single-pilot resource

management (SRM) into every flight operation. This will provide students with the higher order thinking skills essential to safe flight.

Question: Am I required to teach using a FITS-accepted syllabus?

Answer: No. A FITS-accepted syllabus is but one tool for training pilots. While you may teach in any manner consistent with the regulations, the FAA strongly encourages taking advantage of the many benefits offered through FITS.

Question: Must I develop FITS-based training materials in order to earn or maintain my flight instructor certificate?

Answer: No. Again, FITS is an incentive-based initiative designed to help you train students more effectively. The FAA is simply providing tools to help you offer better instruction.

Question: Must the FAA accept my FITS curricula prior to its use?

Answer: No. You have the option of submitting your program for acceptance, but just as in other training accomplished under part 61, an instructor is not required to teach using an approved or accepted syllabus, FITS or otherwise.

Question: Must I follow the format used in this document when developing my FITS program?

Answer: Absolutely not! This guide, along with other previously accepted FITS programs, is but one method of developing a compliant syllabus. A document outlining FITS development criteria is also available at <http://www.faa.gov/avr/afs/FITS/documents/fitscriteria.pdf>. FITS is predicated on the idea that instructors need to be innovative in helping their students to become safer pilots, and the FAA does not wish to stifle creativity by mandating a single path for acceptance.

Question: Will the FAA accept a FITS syllabus that is not specifically focused on technically advanced aircraft?

Answer: No. However, the FITS approach to incorporating system safety is highly relevant to many types of flight training. While you may not earn FITS acceptance for a tail wheel transition course in a J-3 Cub, the principles highlighted in this guide will likely prove valuable in the development of course materials.

Question: If I develop a FITS-accepted program, will it appear on the FAA's FITS web site?

Answer: It depends. If you would like to have your program appear on the FITS web site, the FAA will be pleased to make it available to the public. This type of knowledge sharing has obvious benefits for the entire flight training community. However, the FAA respects an individual's right to guard their intellectual property. As a result, persons who wish to have their materials held from publication need only state so in their submission to the FAA.

Question: What is the difference between an *approval* and *acceptance*?

Answer: An approval is given to those items, processes, or procedures required for regulatory compliance. For example, the FAA will *approve* an aircraft's operating manual. A training program required for a part 141-certificated flight school must also be *approved*. Because FITS training is not mandated by regulation and involves an industry standard, it would go through an *acceptance* process. As a practical matter, a program submitted for FITS *acceptance* will undergo a detailed analysis similar to that of an *approved* training program.

Question: If it isn't mandatory, why should I take the time to develop a FITS-type training syllabus?

Answer: The process of developing a FITS-type training syllabus has its own rewards beyond regulatory compliance. Integrating FITS into each flight lesson may help you to take a fresh look at how you train pilots. You'll develop the habit of viewing each maneuver not as a series of mechanical procedures, but rather as an integral part of a flight "system" that must be managed in order to optimize safety. This process will not only make you a better instructor, it will also help you to train safer pilots.

Question: Why should I develop a FITS syllabus when there are generic resources available through the FAA?

Answer: While the generic syllabi available through the FAA may serve as excellent resources, you are still encouraged to undertake the development of your own unique training curricula. This not only allows you to tailor your instructional approach to meet your student's needs, it will also challenge you to take a critical look at your own approach to flight training.

Conclusion

General aviation, once a homogeneous community comprised mostly of "round gauge" piston singles, now includes everything from ultralight and sport aircraft to single-pilot and crew-served jets capable of operating above 40,000 feet. Systems that were once the exclusive domain of airline cockpits are now readily available in many small piston-powered aircraft. Clearly, a one-size-fits-all approach is no longer adequate in meeting the demands of pilots and flight instructors. The pace of development and other systemic changes no longer afford us the luxury of a slow, unprogressive approach to flight training policy. That is why the success of FITS is so critical to the FAA, to manufactures, to flight schools, and to you, the flight instructor. The stakes have never been higher, but then again, neither have the potential benefits. With the active support and involvement of instructors like you, FITS will prove an indispensable tool in reducing aircraft accidents. *Welcome to the future of flight training!*